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Original Articles

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PROPHYLAXIS OF CANCER*

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AT this time in the history of the world, when mass psychology is geared to the belief that *any* problem of science can readily be solved if enough money and brains are thrown into the project, the solution of the riddle of cancer seems painfully slow and laggard. A superficial examination, based only on actual end-results, would indicate that our present knowledge of the causes of cancer, its effective prophylaxis, and the cure of patients with the disease, is still meagre and at a low level. This does not hold true, however, if we scrutinize the picture more closely, for we will then find that real progress has been, and is being made in the three fields of cause, prevention, and cure.

We have gone a long way in furthering our knowledge of the cause of *many* types of cancer; a long way on the road of prevention of certain types of cancer; and a long way toward improving the results of therapy in a few types of human cancer. As our knowledge and skill increase, further improvements in our efforts toward prevention and cure are slowly being brought about. Progress is being made in each of the three fields. It may be profitable to be dissatisfied with our *rate* of progress, but we must not be discouraged. An atom bomb-

* Address before the 19th Graduate Fortnight of The New York Academy of Medicine, October 18, 1946.

conscious public, fed on spectacular accounts of scientific achievements, is naturally impatient for a miracle in the conquest of cancer, but we do not look for any over night solution.

The problem of the prevention of cancer is fundamentally linked to the *cause* of cancer. There are many factors tied up in the cause which must here receive collateral consideration; for it is the collateral factors which give us the opportunity to introduce prevention.

In general, there are two basic attributes in the production of a cancer. First, the *intrinsic factor:* that is, those elements which are inherent within the cell itself; and secondly, there are the *extrinsic factors,* or the environment of the cell, which influence cell life and growth. In the latter lie our main opportunities to prevent cancer, as we can frequently change the environment of the cell.

You may ask, "What is prophylaxis of cancer?"

Prophylaxis is the detection and the correction of conditions under which cancer is known to arise; and the treatment of lesions which we recognize will eventuate in cancer.

In a consideration of the *intrinsic factors,* one must give thought to heredity. Cohnheim's theory of the inclusion rest also belongs here. Von Recklinghausen's disease and one of its frequent concomitants, neurogenic sarcoma; hairy pigmented nevi, and even melanoma, should be considered as the result of intrinsic factors. On the other hand, the rarity of cancer of the cervix in the Jewish woman is probably due not so much to the heredity factor of the race itself, as it is to the absence of local chemical changes and bacterial putrefaction in a race that practices the religious rite of circumcision.

A perfect example of the *intrinsic* factor produced by an outside agent is that experiment of Little and Bagg, who radiated the germ plasm of mice. By this external agent they were able, after several generations, to produce litters having only one kidney, having webbed toes, etc., indicating that certain chromosomes and genes were modified by the *external* agent, even though it was the *intrinsic* factor which is chiefly manifested in inheritance.

On the other hand, the environmental, or extrinsic, factors bring us to an exact consideration of the hazards of chronic irritation, of virus-like bodies, of hormones, of avitaminosis, of the insults of actinic rays and radioactive rays, of carcinogenic chemicals, of thermal, mechanical and parasitic trauma, in the production of cancer. A new

opportunity for a practical approach to changing the environmental hazards leading up to cancer is being afforded through the annual physical examination of so-called well persons, and through the cancer prevention clinics and centers, a recent development in American medicine.

The reluctance of the average American to go to his family doctor for an annual physical check-up is well known. His attitude is: "Why should I go for such an examination when I am feeling perfectly well?" The attempts of organized medicine, such as the American Medical Association and the American College of Surgeons, to get people to safeguard themselves by such examinations, have not met with the response we had hoped. However, the efforts of the American Cancer Society to educate the public by way of the radio, lectures, and the press, have apparently succeeded in creating a nation-wide demand for such a service as prevention or detection clinics. And it is to the family doctor, as well as to these cancer prevention clinics, that we must chiefly look if we are to increase the scope of prevention of cancer.

Skin: 1. Some years ago at the International Cancer Conference in Madrid, the late Dr. Ewing went to great lengths to point out the deleterious effects of excessive doses of sunshine in the production of skin cancer. It is my opinion that sunburn in the young is not nearly so important as sunburn in those past middle age and in those who have aging skin. Skin subjected to large amounts of actinic rays during the summer too frequently is presented to the doctor in the fall, covered with precancerous lesions, such as epithelial papillomata, verrucae, and pigmented nevi. I well remember a Columbia professor who was extremely fond of sunshine in excessive doses. One winter he spent two weeks in Florida, where he carried out his annual sun ritual. On his return to New York, I saw him and found an acute cancer of almost the entire lower lip.

The development of basal cell cancers on the forehead, nose and lip is common in those golfers who spend hours in the sun bareheaded. Likewise among fishermen, even when they wear head covering, but who get excessive actinic rays from the reflection of the sun on the water.

The removal of all precancerous lesions of the skin will save many a life from cancer, as skin cancer is the easiest of all types to cure.

2. Anyone who has ever had even a single dose of low voltage

x-ray applied to the skin is a possible candidate for subsequent skin cancer. Atrophy of the oil glands and of the skin begins with the x-ray treatment and its resultant x-ray dermatitis. Hayes E. Martin has made an interesting study of skin cancers resulting from x-ray therapy, especially in that group of women who received x-ray treatment for the removal of superfluous facial hair. It is significant that many develop cancers of the skin a number of years later—as late as 20 years subsequently; and some even after only one x-ray treatment. X-rays or radium applied to human skin has far greater danger than is generally recognized even by the great majority of the medical profession.

3. A melanoma, either black or non-pigmented, should be surgically removed before the opportunity for mechanical insult, infection, or razor cut, is presented. And incidentally, anyone with a large experience in melanomas is impressed with the inadequacy of dealing with the problem of total excision by the use of the electro-surgical needle —by desiccation. In doing a surgical excision, make it a rule to go wide of the melanoma, and as deep into the tissues beneath as one goes wide of it. A practical rule of value is to excise those skin lesions which are unquestionably of black pigment, and leave alone those which are brown. The exceptions to this rule are the epithelial papillomata, which are black due to the accumulation of dirt in the interstices of the projecting papillomata. A practical differentiation in diagnosis has been brought out by Pack who scrubs the lesion with soap and water. By so doing, the lesion becomes white if it is a true epithelial papilloma, and remains black, if a melanoma.

4. Every large skin burn which does not heal properly should be grafted. The prevention of cancer in burn scars is nearly 100 per cent possible if grafting is done at the correct time. Radiated lupus, if suspicious, should be grafted. With the development of arsenical dermatitis, excision of damaged areas and grafting are imperative, and this also applies to kraurosis vulvae.

5. Workers in gas service stations and oil plants have presented a new group of skin cancers of the hand. This occupational disease is caused by neglect of the workers to scrub the tar, oil and gasoline from the dorsum of the hand, where they remain as irritating chemicals, frequently producing skin cancer.

Thyroid: As has been pointed out by Lahey, thyroid cancers frequently begin in the thyroid adenoma. Removal of the adenoma leaves

little opportunity for the subsequent development of a thyroid cancer.

Breast: 1. Fibroadenomata occur in young women, and make their first appearance during and after the development of the breast, at puberty, approximately from 13 to 18 years of age. It is well to remove them, as they may rarely become the seat of either a carcinoma or a sarcoma, depending on which element, epithelial or fibrous, takes on malignant characteristics. Only an extremely small percentage, however, become malignant. It so happened that the last case Dr. Ewing and I had together was that of a young woman of 29 years, who had a "carcinoma simplex" develop in a fibroadenoma. Since writing this article, I was much surprised to find that Grantley Taylor of Boston, a previous speaker on this Graduate Fortnight, stated definitely here that fibroadenomata never become malignant. This viewpoint is contrary to the monumental work of Gross, and most modern pathologists.

2. The papilloma has always been considered a precancerous lesion of the breast, and the practice has grown up about this lesion of performing a simple mastectomy as a prophylactic measure. I deplore this treatment, and consider the proper way to handle the lesion is to excise it locally. Of course, the great difficulty lies in one's ability to find the lesion, whose presence is called to our attention by blood, or lemon-yellow or clear serum emerging from one of the 20 ducts of the nipple.

If one takes great care and time, he will usually find the papilloma, as it is practically always within the areolar area or within the terminal ducts of the nipple itself. If blood comes through a duct of the nipple, one can usually localize it by two methods.

First: Stroke gently but with the necessary degree of pressure from the areolar edge up to the nipple itself. It may first be necessary to cleanse the nipple thoroughly with soap and water, in order to dislodge the dried clot which may be imbedded in the very terminal portion of the duct, and which may be responsible for not allowing free flow from a duct that is filled with blood and papilloma. By stroking carefully over the entire area surrounding the nipple, one is usually able to find a place pressure on which produces the bloody discharge on the nipple surface. As a rule, when one locates this, he will find a faint thickening or a definite elongated area representing the widely dilated duct which is affected.

Secondly: In cases where there is a definite bloody discharge, the transillumination light will reveal a black streak leading from the nipple

to the papilloma. This black streak represents the shadow of the blood-filled duct. The picture is very striking when it can be demonstrated.

In cases of sero-sanguineous, lemon-yellow, or clear serum discharge, the light is of little value in localization.

In a study of 129 cases of papilloma, papillary cystadenoma, and papillary cystadenocarcinoma (the malignant stage in the life history of the tumor) I found that the difference in the age group of the patients with the lesion still benign and patients with the lesion malignant, was a spread of twelve years. I therefore drew the conclusion that it took a period of years for a papilloma to become a malignant tumor.

3. *Cysts.* I mention cysts, cystic mastitis and cystic disease of the breast only for the purpose of discarding them as precancerous lesions. There are some, however, who believe these lesions to be precancerous; this group is championed by Shields Warren of Boston. I do not believe these lesions represent precancerous states. If cancer develops in a cystic breast, it is a coincidence and not due to the presence of cysts. Literally thousands of cases of cystic disease occur, which lesions disappear without ever having been seen by a doctor. Cystic disease is an ovarian hormone imbalance disease which is spontaneously terminated with the appearance of the menopause. Above all else the clinician must be certain that he is dealing with a cyst or cystic disease and it may require a biopsy or needle puncture to determine this.

4. In the young woman from 20 to 35 years of age, it is common for premenstrual lumps to appear, then disappear after the period. In this age group, I am not quick to operate, preferring to allow a reasonable time to elapse before suggesting a removal of the lump.

In the succeeding 10 to 15 years, however, I do not hesitate to remove the lump which is a localized area of mastitis. In a study of such cases, we have found that following the years of active menstruation, it is at exactly this site that a carcinoma may develop. During the post-menopausal years, the mammary gland undergoes almost complete atrophy, but the area of mastitis frequently persists and one portion of it may become carcinomatous. It is therefore wise to remove a persistent area of mastitis in women over 35 years of age.

5. In recent years, a lesion of the breast was described by Stewart and Foote which they termed "totilobular carcinoma in situ." In its early stages, before any clinical signs are developed and before there is any extension into surrounding lobules, the lesion is easily cured

by a simple local excision of the tumor itself. In fact, the finding of most of these tumors has been accidental during the course of operating on some other growth. This lesion has been considered to be precancerous by some pathologists. However, it may develop into a true carcinoma. It should be locally removed; but as most of my experience with it has been in connection with another lesion, it is difficult to make a pre-operative diagnosis as it lacks clinical signs. Later stages of "carcinoma in situ" show it capable of metastasis and full fruition as a carcinoma.

6. Certain breasts are the seat of a chronic irritation due to stasis. The ducts are widely dilated, and are filled with a putty-like material which remains as a source of infiltration by leukocytes. Ewing has often pointed out that there is a close association of mammary cancer and duct stasis. This correlation of stasis and cancer is denied by Stewart. We frequently obtain in these stasis cases large amounts of thick, dirty material by stroking toward the nipple and emptying, at least temporarily, the large terminal ducts. It is not possible to clear the entire breast by mechanical means; but it is possible that by this manipulation, we may obtain a reduction of the chronic irritation within the breast.

Cervix Uteri: It is generally conceded that carcinoma of the cervix usually develops in the presence of lacerations, erosions, bacterial infections and putrefaction—a combination of mechanical insult and chemical irritation.

The incidence of cancer of the cervix can be materially reduced by the mechanical repair of the lacerations and erosions; and by improvement of environmental conditions, such as by the practice of daily douches.

Smith of the Woman's Free Hospital of Boston, and several other observers have been impressed with the great local improvement in the cervix following electro-desiccation of a badly lacerated and infected cervix. And it is their belief that cancer rarely develops after such an electro-desiccation repair. Pemberton cites 1087 cases in which repair of the cervix was done. Cancer developed in from 5 to 36 years subsequently in only 23 cases (2 per cent).

Fewer opportunities would be present for the development of cancer of the cervix if, instead of performing a supracervical hysterectomy for a fibroid uterus, a complete hysterectomy, including the cervix, were done.

Because of the almost complete absence of cancer of the cervix in Hebrew women, it could be inferred that if circumcision were universally practiced, there would be, in all probability, less infection of the cervix, with a resultant lessening of the disease.

Reduction in the number of cases of cancer of the cervix can be effected not only by changing the environment, as suggested above, but it is especially in this field that one of the newer contributions of great value has been made to American medicine by Papanicolaou. His study of the vaginal smear cells is a contribution which gives those familiar with it a valuable clue in recognizing early carcinoma. Papanicolaou's study is a decided advance in the early diagnosis of cancer of the cervix, making possible the recognition of early lesions within the canal before they come within the realm of clinical observation.

This profitable study has been more selectively carried out by Ayre and his co-workers at McGill University, who state that "the cervical cytology smear will differentiate in over 95 per cent of cases." (Personal communication.) Their study shows "that the cervical aspiration is so accurate that in a survey of over 2,200 cases, the average deviation between cytology and biopsy was only 2.96 per cent." Ayre also describes a series of clinically normal-appearing cervices where the cytology test diagnosed pre-invasive cancers before there was even any clinical indication to do a biopsy.

These additions by Papanicolaou and by Ayre are scientific contributions of enormous value in the field of the cure of cancer.

In carcinoma of the body of the uterus, much investigative work remains to be done in the field of a hormone approach to the problem. It is generally believed that the development of adenocarcinoma of the corpus uteri is much dependent on the ovarian hormone influence. The environment of the uterine lining could be modified by androgen and estrogen therapy; and it is conceivable that androgen therapy might retard the development of a carcinoma of the body.

Lungs: Among those most familiar with the development of adenoma and carcinoma of the lung, there is growing a feeling that the inhalation of smoke is playing an important role in the great increase of lung tumors. Dr. Ochsner of New Orleans is fond of demonstrating the parallel between the increase of cancer of the lung and the increase in the consumption of cigarettes. The lines are exactly parallel.

The air of our cities is filled with smoke dust, circulating dirt and

burned gasoline fumes. The lungs of the city dweller today are subjected to irritation that their forefathers never experienced.

In certain chemical factories, where there is little opportunity for fresh air to circulate, the workers are subjected to hours of irritation of the bronchi and the bronchiolar lining by acrid gases and suspended dust.

Bladder: In recent years, a perfect experiment was unwittingly conducted in the production of cancer of the bladder. In a nearby city there was a chemical factory whose workers developed a very high incidence of bladder cancer. The management became concerned and had a study made of the local industry. It was shown in the investigation that under the conditions in which the men had to work, they inhaled chemical fumes in large amounts; and these chemicals, which were excreted and recoverable in the urine, were the cause of the bladder cancer. The prophylaxis naturally lay in supplying fresh air to the workmen. Modern ventilation equipment was installed, with the resultant elimination of cases of cancer of the bladder.

Carcinoma of the Testis: For a long time it has been recognized that carcinoma develops much more frequently in cases of undescended testis than when the testis is in the normal position. It is obvious that a good preventive against the development of carcinoma testis is the bringing down into the scrotum of undescended testes, in youth by the injection of testosterone propionate, and in adult life by a surgical operation.

Carcinoma of the Pharynx: In the northern countries, such as Sweden and Finland, where part of the population lives within the Arctic Circle, the principal diet during a large part of the year is reindeer meat and salt fish. Only for a short time are green vegetables available, and as a result, these people develop a condition of the pharynx and tongue known as Plummer-Vinson's disease. It is an avitaminosis, and the disease eventuates in cancer of the pharynx and tongue. By giving these patients sufficient vitamins, Plummer-Vinson's disease can be definitely stopped, so that no cancer will develop.

Stomach: The chronic irritations to which the stomach is subjected are almost too numerous to mention—thermal, chemical, and mechanical.

It is an all too common habit of certain people to drink soup, coffee and other beverages so hot that they must hurry the drink down because their mouths are being burned; and once past the throat, what happens

to the stomach when the scalding liquid hits it is a matter of indifference to them, the stomach having no particular sensation for heat, or excessive heat. The liquid may be entirely too hot to hold the finger in, but the poor stomach has to take it, no matter what the damage to the stomach mucosa.

The great American habit of the drugstore lunch, where stenographers and business men snatch a quick sandwich and wash it down with hasty gulps of hot coffee at the soda fountain, while the next customers stand behind them, breathing down their necks and trampling on their corns, is certainly not conducive to the peace and relaxation which should accompany mastication and the ingestion of food.

The stomach mucosa is a delicate but jealous structure. It must be handled with proper respect because it has the power to throw out on insult sufficient hydrochloric acid to burn a hole in the wall of the stomach. And once an ulcer develops, it is difficult to heal and becomes the source of a possible carcinoma. I am not overlooking the old controversy of which came first, the ulcer or the carcinoma. But we do know that repeated healings of any ulcer, as, for example, a burn scar, brings with it the possibility of the development of a carcinoma.

It has often been noted that those with marked pyorrhea seem to be better candidates for the development of a gastric carcinoma than individuals with uninfected mouths.

The American appetite for alcohol in almost any guise remains undiminished in spite of the fact that it can easily be demonstrated microscopically that a cocktail, for example, acts as an insult to the gastric mucosa, producing a temporary gastritis. Fortunately for the tipplers, the mucosa is restored within a period of a few hours. The work of Ivy of Chicago on gastritis is extremely impressive, as it shows how very delicate the gastric mucosa actually is and how quickly it repairs itself.

I am inclined to feel that eating a large meal at a time when one is physically exhausted is a bad habit, as the muscular action of the organ is much delayed, and the food lies in the stomach as an irritant for several additional hours.

Mouth, Tongue, Cheek, Tonsil: I have saved for the last a discussion of the classic example known to every medical graduate. Cancer of the mouth, tongue, tonsil, and inside of the cheek is found to a large extent in cases demonstrating pyorrhea, sharp teeth, ill-fitting dentures, smoking in excess, or syphilis.

Of all the types of cancer, the intra-oral group is the most easily prevented. A sharp or broken tooth can be ground down. A tooth standing out of alignment can be, even if it is only moderately sharp, the source of a constant mechanical injury to the tongue—which is an organ never in repose except during sleep. The cheek or tongue constantly rubbing against a denture that is sharp or rough can be mechanically torn many times a day. These mechanical insults in the presence of chronic infection of the mouth due to lack of dental hygiene, frequently are the cause of intra-oral cancer. Excess smoking constantly produces a burning of the tongue and cheeks and lip. Intra-oral cancer develops notoriously in the presence of syphilis and leukoplakia. The prevention of mouth cancer therefore lies in the correction of pyorrhea and of ill-fitting dentures, of repairing broken and sharp teeth, of changing the smoking habits, and of curing lues.

Conclusion: I have discussed nearly forty ways of interfering with the development of specific cancers. We have the means at hand. If the public and the medical profession were to give more serious attention to our present possibilities of *preventing* cancer, the magnitude of our cancer problem would be materially lessened.

THE EARLY DIAGNOSIS OF CANCER*

ELISE S. L'ESPERANCE

Director of Kate Depew Strang Cancer Prevention Clinics,
Memorial Hospital and The New York Infirmary

It is a privilege to be invited to contribute to this program the information obtained from our cautious experiment in cancer prevention and early diagnosis.

Cancer is one of the major problems in medicine today and early diagnosis is the corner stone on which the entire structure of cancer control rests. Therefore, the early diagnosis of cancer or if possible its prevention should be a constant responsibility in the mind of every practicing physician.

During the past, the greatest emphasis has been placed on research and the progressive development in the various methods of treatment. Irradiation therapy was received with great enthusiasm, first as the sole method of treatment and later combined efficiently with surgery. Miracles have been performed through the union of these two effective members of the physicians' armament against cancer.

The curative benefits of these *should not be minimized*, for records show an ever increasing number of cases alive after five, ten or even fifteen years following this scientific treatment. Still, cancer continues to occupy second place in all recorded deaths in the United States. We may partly explain this discouraging prospect by balancing it against the fact that life expectancy has increased by fifteen years in the last half century, and with the advances in accurate diagnosis, a greater number of cancers would be recognized. Even this rather questionable explanation does not entirely serve to account for the continued increase.

Progress in treatment does not always control or eradicate a disease or materially reduce the mortality, no matter how efficient and praiseworthy. Take typhoid fever for example, although we know the cause, the ultimate control of this disease depends largely on preventive medicine. And this applies to many other serious diseases.

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In 1926 Ewing stated that "in the control of cancer, prevention must play a prominent role for it appears more and more evident that early diagnosis alone is not capable of accomplishing the desired reduction in death rate."

Yet prevention and early diagnosis in cancer have been neglected these many years. Possibly this is due to the fact that the cause of cancer is unknown, and it is the generally accepted theory that the cause of a disease must be known before it can be adequately controlled. Even though we do not know the etiology of cancer, nevertheless we have very definite knowledge concerning its life history. We know that cancer does not develop suddenly in previously normal structures, but slowly, often following prolonged irritation, and requires a certain time interval to become fully malignant. It is in this quiescent period between the local disease and the full blown cancer that early diagnosis can play such an active part. *For effective treatment is that instituted at a time when the process is localized.*

The problem of early diagnosis in cancer is by no means an easy one, for in its earliest phases there may be few characteristic symptoms usually not of sufficient diagnostic importance to be recognized except by well trained physicians. Furthermore, the protean nature of cancer which is apt to masquerade under the guise of a host of common disorders, and may involve any organ in the body from birth to old age, presents a situation which requires considerable fundamental training and the keenest clinical judgment. Perhaps it may be insufficient training, undue optimism, or overwork among practicing physicians which accounts in part for the high incidence of advanced undiagnosed cancer that reach the specialist in an incurable stage. But an important element in the failure to obtain an early diagnosis is the difficulty encountered in persuading patients to seek medical aid promptly. The dominant reason for this hesitation on the part of the public to consult physicians is the fear that they might discover they had cancer. The active propaganda campaigns of the American Cancer Society have done much to overcome this latent dread of the disease and they have created an eager interested people willing to avail themselves of any opportunity which might prevent their falling a victim of cancer. This placed the responsibility of providing the facilities for the possible prevention and early diagnosis of cancer squarely on the shoulders of the physician. There appeared to be only one way that this obligation could be met,

TABLE I

STRANG CANCER PREVENTION CLINIC—NEW YORK INFIRMARY

	1944	1945
Total Patients	370	1047
Age Groups		
Under 40	283	530
Over 40	187	517
Family History	157	478
No Family History	213	569
Cancer	7 (2%)	11 (1%)

TABLE II

STRANG CANCER PREVENTION CLINIC MEMORIAL HOSPITAL

Diagnoses	1940	1941	1942	1943	1944	1945
Cancer	4	7	38	21	17	31
Benign Tumors	4	35	130	136	206	523

TABLE III

STRANG MEMORIAL PREVENTION CLINIC—MEMORIAL HOSPITAL
GROWTH OF CLINIC

	1940	1941	1942	1943	1944	1945
New Patients	16	150	519	507	1039	3066
Return Patients	9	161	592	1077	1653	3161
Total	25	311	1111	1584	2692	6227

that was by *periodic cancer health examinations* of presumably well individuals. The public was interested and anxious to coöperate and it seemed that some way should be found to provide the opportunity for such examinations. Therefore, in May 1937 as a cautious experiment we designated a special clinic day in the Kate Depew Strang Tumor Diagnostic Clinic of the New York Infirmary for the complete physical examination of apparently healthy women who were anxious to know

TABLE IV

STRANG CANCER PREVENTION CLINIC—MEMORIAL HOSPITAL
ANALYSIS OF MAJOR DIAGNOSES IN 1945

Total New Patients Seen	3066
Cancer	31
Benign Tumors	523
Fibromyoma	74
Nevi	67
Lipoma	24
Thyroid Adenoma	9
Papilloma (Skin)	24
Other Conditions	1958
Hypertensive Cardio-Vascular Disease	71
Chronic Cervicitis	316
Mastitis	184
Tuberculosis	5
Diabetes	2
No Evidence of Disease	474

if they had cancer. This was the first organized attempt toward possible prevention and early diagnosis in cancer. *It was a tentative plan to prove whether prevention and early diagnosis* in cancer could become a practical part of a medical health service.

There was considerable discussion and debate as to the justification of the use of the term "Cancer Prevention Clinic." If the public could be persuaded to bring their early cancers to the physician for diagnosis, how much more readily would they come for examination if there were the slightest hope that the development of cancer may be prevented. This is sound psychology and the phenomenal growth of the Strang Cancer Prevention Clinics substantiates such a theory.

In 1940 a similar Cancer Prevention Clinic for women was opened at Memorial Hospital, and in 1944 such a Clinic for the examination of men was established there. In the first year at the New York Infirmary, seventy-one women were examined, and in 1945, five thousand three hundred and twenty five new patients, which included men and women, were examined in all the Cancer Prevention Clinics at both institutions.

One may well ask what is meant by the term "Prevention and

TABLE V

STRANG CANCER PREVENTION CLINIC—MEMORIAL HOSPITAL

Source of Patients	1941	1942	1943	1944	1945
N.Y. C.C.C.	60	221	177	140	99
Publicity	27	157	112	574	1898
Memorial Hospital	32	58	66	62	42
Strang Patients	16	54	109	209	976
Local M.D.	15	18	23	36	51

Early Diagnosis of Cancer." Really they are different steps in the same process and have the same ultimate goal: that is, the prevention of fully developed malignant tumors through early diagnosis. In our Clinics we consider all the predisposing factors that may precede or predispose to cancer and of these there is a vast amount of knowledge.

It is well known that many forms of chronic irritation, long continued, produce an inflammatory hyperplasia, often designated as precancerous, which if the irritant continues may and frequently does become transferred into cancer; in a comprehensive physical examination all of the possibilities must be taken into consideration. For example, the chronic irritation produced by ill-fitting dental plates, excessive use of tobacco and syphilitic leukoplakia may tend to induce a wide variety of cancers of the mouth, lip, and tongue, as well as the larynx. Eliminate these factors and the incidence of intraoral cancer should largely disappear. Persistent hoarseness or intermittent loss of voice should make the keen observer suspect carcinoma of the larynx and a laryngoscopic examination is the best means of early diagnosis, supplemented by a surgical biopsy of suspected lesions. Likewise, in early carcinoma of the tongue, leukoplakia which begins to crack open or a deviation on protrusion may be the earliest sign that cancer is imminent.

In cancer of the skin we have a wide variety of precancerous dermatoses, and the larger group of papillomata. The small persistent white nodules which mark the beginnings of basal cell carcinoma may be recognized and treated early before they become active. Then there are the pigmented and nonpigmented nevi, many of which are potential melanomas, and if in an area subject to irritation should receive the most expert attention.

The small basal cell epidermoid carcinoma usually occurring on the face, if recognized early, may be completely cured by radiation.

Mammary cancer still appears almost beyond the reach of effective prevention and early diagnosis. The very subtleness of early cancer in a functioning organ such as the breast adds a disturbing factor to the interpretation of diseases there. Simple palpation of the breast is too often neglected in a physical examination. Nevertheless such an examination when done by a well trained physician may give invaluable information and with a little experience one may differentiate by this means, chronic mastitis, simple cysts and fibroadenoma from early carcinoma. There is quite a distinct difference in the distribution, consistency and the degree of fixation to the surrounding tissues in these various lesions. The best preliminary training for the early diagnosis of breast cancer is to form the habit of examining all normal breasts at different ages.

We rely almost exclusively on the periodic manual examination of the breasts in all cases as the most satisfactory guide for further diagnostic investigation of any disease in the breast. In the presence of any suspicious lesions all the special aids in diagnosis of cancer of the breast are brought into action until an accurate diagnosis is reached.

Transillumination of the breast is of value in differentiating cystic from solid tumors, large duct papillomas, sarcomas, and hematomas, but is inferior in accuracy to the aspiration biopsy.

Soft tissue x-ray of the breast as described by Warren,[1] while difficult of interpretation, still in the hands of an experienced radiologist may give suggestive information. It is especially useful in large heavy breasts where palpation is difficult. Scharnagel[2] examined seventy cases of tumors of the breast by this method and the results indicate that it may be of assistance in differentiating benign from malignant tumors.

The aspiration biopsy (H. E. Martin[3]) when properly employed gives very dependable information and is of unquestionable value in recognizing early carcinoma of the breast. As carried out in our Clinics at Memorial Hospital and the New York Infirmary it affords a fairly rapid and accurate method of determining the nature of neoplasms of the breast. In a series of 100 cases of breast cancer from the Tumor Diagnostic Clinic at the New York Infirmary, 64 per cent were positive by aspiration biopsy; 28 per cent showed suspicious cancer cells, thus giving a high degree of accuracy by this simple means. All

of these cases were confirmed by surgical biopsy or the clinical course of the disease. The hazards of this method seem negligible, for Stewart reports no harmful effects following this procedure.

A negative report, however, is of no significance, and in the presence of clinical evidence of disease, the removal of the breast nodule with provision for immediate gross and microscopic examination of tissue is indicated.

The most frequent cancer in women is that involving the uterus and it is responsible for about 30 to 35 per cent of deaths from this disease.

In 1938 Catharine Macfarlane[4] of Philadelphia established a specialized clinic for the examination of 1000 apparently normal women to determine the value of periodic gynecological examinations in the prevention and early diagnosis of cancer of the uterus. She found 1.8 per cent cancer among these women. Her results indicate the importance of treatment for the host of chronic inflammatory diseases encountered in the cervix, many of which have potentialities of future carcinoma.

In the recognition of early carcinoma of the cervix we employ every diagnostic aid.

The Schiller Iodine Test gives some information but little more than can be obtained by an accurate survey.

The Papanicolaou[5] vaginal smears and the direct cervical smear occupy an important place and are routine on all our cases. In the presence of a suspicious lesion a surgical biopsy is the method of choice.

The role of surgical biopsies in the early diagnosis of cervix cancer can hardly be overemphasized. Evidence to support this is based on the results obtained in our Clinics. During the past year at Memorial Hospital, Stewart and Foote have confirmed nine of our cases of intra-epithelial epidermoid carcinoma—carcinoma in situ—by this means, when a simple amputation of the cervix may be effective. It suggests the advisability of establishing this rather simple measure as a routine. We are not satisfied with one negative report if there is a lesion of the cervix. This is well illustrated by a recent case. This young woman had a positive cervical smear but the report of the surgical biopsy was negative. The biopsy was repeated and the lesion proved to be early carcinoma.

The future value of this method is further strengthened by the recent report of Pund and Auerbach[6] who examined, in serial sections,

TABLE VI

SUMMARY OF CLINICAL APPLICATION OF VAGINAL SMEARS AS A ROUTINE PROCEDURE—JANUARY 1, 1945 TO JANUARY 1, 1946 AT STRANG CLINIC, MEMORIAL HOSPITAL AND NEW YORK INFIRMARY

Total Number Cases Examined (Cervical and Vaginal Smears)	7168
Positive Diagnoses Made From Smears	67
Positive Diagnoses Confirmed by Biopsy	26
Positive Diagnoses Refuted by Biopsy	17
Cases Which Were Not Followed by Biopsy	24

1200 surgically removed cervices and state that preinvasive carcinoma was discovered in 47 or 3.9 per cent of the cases so examined. No gross manifestations of carcinoma were found in any of them. The average age of the patients was 36.6 years as contrasted with 48 years, the usual age of fully developed cancer of the cervix. This seems to substantiate the theory long held by Ewing and Fred Stewart that the latent period of quiescent cancer may be from five to ten years or more; and that the carcinomatous process is a distinctly evolutionary one having a local starting point and pursuing a known course to a definite termination. Therefore it is reasonable to infer one may encounter the disease in any one of its phases.

Prevention and early diagnosis in cancer of the fundus is more difficult and dependence should be placed on the routine vaginal examination as the most effective measure associated with the endometrial aspiration biopsy. Uterine bleeding is always suspicious, but unfortunately is not an early symptom of carcinoma of the fundus. When it does occur it may be due to atrophic endometritis, an endocrine disturbance, or even hypertension. Only a careful analysis can decide the nature of the disease. All diagnostic adjuncts including a uterine curettage should be employed before reaching a final conclusion.

Smears by the Papanicolaou method are useful in determining the necessary future steps to arrive at a diagnosis. In our experience if repeated positive smears are obtained and no evidence of disease of the cervix is observed on vaginal examination it is an indication for a uterine curettage to determine the presence or absence of carcinoma of the fundus.

The significance of these positive smears is not always evident to

TABLE VII

STRANG CANCER PREVENTION CLINIC—MEMORIAL HOSPITAL

Disposition of Patients	1942	1943	1944	1945
Local M.D.	150	103	239	759
Memorial Clinics	62	59	51	123
Other Clinics	46	39	32	38
Observation	250	287	717	2146

the general practitioner and as we refer our cases to the physician for treatment, it not infrequently happens that there is an unfortunate delay in obtaining the diagnostic curettage.

The importance of this is illustrated by a case in our Clinic at Memorial Hospital. A patient with three positive vaginal smears was referred to her physician with the report of our findings and the information that in our experience this indicated the necessity of a uterine curettage to determine the condition of the endometrium. Three months later the patient revisited our Clinic and reported that her physician did not deem the operation necessary. On examination these smears were again positive and her physician was so notified. Six months later she returned with uterine bleeding and a fully developed adenocarcinoma of the fundus.

In gastro-intestinal carcinoma the only form of early diagnosis available is the use of all means at our disposal for the recognition of the earliest evidence of gastro-intestinal lesions. A routine gastro-intestinal radiographic examination is the most satisfactory method at the present time. Whether one is justified in submitting all normal persons to this examination must be decided in the future. We have not attempted such a procedure in our Clinics but have limited our gastro-intestinal x-ray examinations to patients with vague gastric or abdominal symptoms. This method has paid dividends many times in the early diagnosis of unsuspected duodenal and peptic ulcer, in one case of gastritis polyposa and two cases of gastric carcinoma. Recently we have instituted a fluoroscopic investigation of the stomach in presumably healthy persons over 45 years of age in coöperation with the Radiographic Department of Memorial Hospital. So far this has yielded rather interesting facts. In the first 505 cases examined an extremely unusual myosarcoma

of the lower esophagus in a young woman without symptoms was recognized at a stage which permitted successful operative procedure. Whether such examinations will prove of sufficient practical importance to be included as a routine in cancer health examinations will depend on the results obtained in a long series of cases interpreted by an experienced radiologist. A gastro-intestinal x-ray series, gastric analysis, esophagoscopic and gastroscopic examinations should supplement the gastric survey in all suspected lesions.

Prevention and early diagnosis in rectal cancer depends largely on the skillfulness of a thorough rectal examination of all cases. In the Cancer Prevention Clinic at Memorial Hospital a proctoscopic examination under the direction of the Rectal Department, of persons over 45 years of age has been added as a routine practice for the past six months. In 194 cases without symptoms, examined in the Men's Department of our Clinic, two cases of silent carcinoma of the rectum were discovered. In the entire group of 299 cases with and without symptoms examined with the proctoscope four cases of rectal and sigmoid carcinoma were added to the general statistics. The incidence of rectal polyps in these 299 cases becomes of interest as they are considered precancerous lesions. We found 14 in the rectum and 4 in the sigmoid. In the women's service two cases of symptomless cancers of the rectum were also found by this investigation.

Bladder carcinoma may usually be traced to some form of chronic irritation, such as stones and chronic cystitis. In Egypt this is well illustrated by the fact that ten times as many individuals infected with Schistosoma haematobium develop cancer in contrast to those unaffected. Examination of urine sediment smears as carried out by Papanicolaou and Marshall[7] may be of value. However, all cases of cystitis and urinary calculi should receive prompt and thorough cystoscopic examination with a pyelogram.

The relative frequency and insidious nature of carcinoma of the lung warrants a routine radiographic examination of the chest in all cases. In the presence of any definite pathology recourse should be had to the bronchoscope or the Craver needle for aspiration biopsy. This enables the physician to obtain a fairly accurate pathological report in the shortest possible time.

The most important single method at our disposal for the early diagnosis of cancer is the *comprehensive periodic physical examination*

of an individual by a physician on the alert to recognize early signs of cancer. This is illustrated in a patient who came to our Prevention Clinic complaining of a lump in the breast which proved to be a simple cyst, but the complete examination revealed early unsuspected carcinoma of the cervix.

The physical examination as performed in the Strang Clinics is not limited to any part of the body, but includes a complete survey of the skin surfaces, nasal and oral cavities, eyes, ears, blood pressure, height and weight. The chest is examined by percussion, auscultation and Roentgen films. Palpation of the abdomen is followed by a pelvic examination which includes a vaginal and cervical Papanicolaou smear on all cases, with surgical biopsy on suspicious lesions. A manual rectal examination is routine with proctoscopic examination of all cases over forty-five years. A complete blood count, a urinalysis and a serological test for lues are performed. This entire procedure is repeated at the annual re-examination of the patient.

In our experience the routine blood count has been the means of identifying two cases of early leukemia. Also in a case of presumed arthritis we found Bence-Jones protein in the urine and later confirmed our suspicions of myeloma by radiographic examination of the bones. In another case a positive Kline test gave us the lead for a difficult tongue condition which suggested early carcinoma.

One of the most dependable aids in the early diagnosis of cancer is the aspiration biopsy. This simple technique if properly employed may be applied to both accessible and inaccessible neoplasms. Its use is not limited to any one organ but the accuracy of the diagnosis depends on the skill of the operator and the knowledge of the pathologist. In one of our cases a diagnosis of primary carcinoma of the liver was made on the aspiration biopsy which was later confirmed at an exploratory laparotomy.

Accessible lesions usually give rather definite evidence of their nature by this method. However, a negative finding should be regarded as of little value in the presence of suggestive clinical symptoms. The risk of spreading cancer by aspiration biopsy has been proven negligible (Stewart).

The surgical biopsy is still the most dependable and accurate means of diagnosis in early cancer. It gives an indisputable record readily obtained and has a wide range of usefulness. In the cervix with the use

TABLE VIII

STRANG CANCER PREVENTION CLINIC—MEMORIAL HOSPITAL
ANALYSIS OF CANCERS

	Age					*Symptoms*		*Site of Primary*				*Total*
	21—30	31—40	41—50	51—60	60+	*With*	*Without*	*Skin*	*Breast*	*Cervix*	*Misc.*	
1944	0	5	4	5	3	13	4	4	6	2	5	17
1945	0	7	8	10	6	21	10	15	3	4	9	31

of a biopsy forceps it is a simple painless procedure and should be employed in all suspicious lesions in this region. It is also of value in determining the nature of rectal pathology and with the aid of the proctoscope it is a relatively minor undertaking.

In skin lesions it may be a little more difficult, requiring local anesthesia. It is the only way, however, to arrive at an accurate conclusion as to the nature of the disease. Where the skin lesion is of small size removal of the entire tumor mass is preferable. This applies especially to the innocent looking pigmented nevi which should be removed with a rather wide margin.

Vaginal smears by the direct or Papanicolaou method deserve a prominent place in all gynecological examinations. They are of especial significance for the reason that they may indicate the presence of early carcinoma before other gross signs or clinical symptoms are present.

Jones in a Research Project[8] in the Strang Department has examined 8,636 cases by the smear method from varying types of gynecological disease including suspected or unsuspected cancer with the following results. Of these approximately 8,000 cases, 311 were positive and 81 of these were confirmed by biopsy. Nineteen were not suspected clinically, 152 were not verified by biopsy and seventy were refuted by the biopsy. Even with a possible source of error of interpretation we consider this test as an essential part of a pelvic examination and of sufficient practical importance to justify a thorough investigation of any case in which such a test is positive. There are several advantages in this technique in early diagnosis of cancer: First, its extreme simplicity of operation and second, the fact that the cell changes encountered often precede any gross manifestation of disease.

The positive diagnosis of cancer, however, must rest on the histological report of a surgical biopsy or a uterine curettage. For the serious

implications both to patient and physician embodied in the final diagnosis of malignant disease places a tremendous responsibility on the pathologist. Therefore his interpretation should be supported by every dependable diagnostic means.

We had a rather interesting experience with the Papanicolaou smears. A young woman with vaginal bleeding from whom two positive smears were obtained was recommended to have a uterine curettage. The curettings, however, were negative for cancer. Later as the symptoms continued a laparotomy was performed on the probable diagnosis of ovarian cyst, and a bilateral carcinoma of the fallopian tubes was found.

The possibilities of the smear method of diagnosis are limitless. They may be applied with considerable assurance to almost any secretion of the body. Papanicolaou and Marshall[7] have reported interesting results from examination of urinary sediment for suspected carcinoma of the genito-urinary tract. Similar methods have been applied to sputum in suspected cancer of the lung and in gastric washings for cancer of the stomach. All of these are still in the investigation period and few statistics are available. With further research this method may become of considerable value as an aid in early diagnosis.

In the recognition of all internal and inaccessible cancers, radiographic examination is indispensable. X-ray of the chest in all persons over 35 years of age should be a routine procedure. We include two cases of carcinoma of the lung brought to light by this means.

The differential value of a radiographic examination in all tumors of bone should indicate its wider use in the health examination of young persons. All of these procedures may be carried out in the clinic with ease and safety.

This detailed description of diagnostic methods employed in the Strang Cancer Prevention Clinics[9] is given to emphasize the necessity of a thorough examination which utilizes all the newer diagnostic techniques available to arrive at an accurate diagnosis. Anything short of this may confer a false sense of security to the patient. Each test has been added with the definite purpose of increasing the efficiency in early diagnosis and is often undertaken to evaluate various highly specialized examinations in the diagnosis of obscure or inaccessible cancers.

It is our purpose to continue to maintain this definite research point of view in regard to expansion in both our Strang Cancer Prevention Clinics. We feel that by our association with the Memorial Hospital

TABLE IX

STRANG CANCER PREVENTION CLINIC—MEMORIAL HOSPITAL
MEN'S CLINIC—ANALYSIS OF DIAGNOSES
NOVEMBER 1944 TO JUNE 1946

Total Patients			1329
Cancer			13
Precancerous Lesions			79
Benign Tumors			282
Prostatic Hypertrophy			59
Hemorrhoids			119
Hernias			68
Hypertensive Cardio-Vascular Disease			101
Peptic Ulcer			65
Proctoscopic Examination			
Survey	194	Cancer	5
Diagnostic	105	Polyp	18
Total	299		

Cancer Center we have the opportunity to determine their diagnostic value for the information of future cancer prevention.

These Clinics are maintained for the early diagnosis and possible prevention of cancer only. No treatments are given. One of the important objectives is to encourage the habit of periodic consultation with a physician or clinic, annually for persons under 40 years of age and every six months for those over 40 years, as the best means for the early diagnosis of cancer and to maintain the general health of a community.

What have we learned in the past nine years from this cautious experiment in the early diagnosis and possible prevention of cancer? The Clinic at the New York Infirmary began with seventy one patients the first year. That was in 1937, and in 1945, 1027 new patients were examined and 800 returned for re-examination.

At the Memorial Hospital Women's Clinic 184 women patients were examined during the first thirteen months after its organization in November 1940. In 1945, 3066 new patients were examined and 3161 return visits were made, that is to say a total of 6227 patients in one year. Approximately 40 per cent of all these persons came to the clinics in both hospitals without symptoms or noticeable evidence of

disease. Of these, *one and one-half to two per cent,* varying from year to year were found to have early cancer. About 20 per cent had benign tumors; 9 per cent had precancerous lesions; 43 per cent revealed some unsuspected constitutional disease, and only 16 per cent were found to have no evidence of disease. Sixty per cent revisited the Clinic within one year and 10 per cent within six months.

In the Men's Clinic at Memorial Hospital during the 20 months since its organization, 1329 patients were examined. Of these 13 had cancer; 18 had precancerous rectal or sigmoid polyps, and 48 had some form of leukoplakia of the oral cavity.

In conclusion one may be permitted to mention a few important points gleaned from these Clinics as future possibilities in the successful prevention and early diagnosis in cancer.

The accumulated data contained in the histories of these individuals over a period of years will furnish a basis for the scientific clinical research of many factors involved in the cancer problem, such as the relationship of heredity, mode of life, age incidence, precancerous lesions and diseases to the development of cancer.

The diagnostic results obtained offer convincing evidence of the importance of periodic cancer health examinations in the control of cancer and possibly a host of other diseases. The rapid growth demonstrates the willingness and desire of the people to accept such a program. This demand by the average person gives an opportunity to the medical profession to utilize this enthusiastic response and develop universal periodic cancer health examinations of presumably well persons.

The Medical Society of the County of New York has recently endorsed the proposal of the New York City Cancer Committee to sponsor and establish Cancer Prevention Clinics in a group of voluntary hospitals in New York City. It is to be hoped that every large community will follow this example.

The Department of Preventive Medicine in Cornell University Medical College has recognized their value in the teaching of cancer and for the past year groups of students have attended sessions of our Clinics at Memorial Hospital as an integral part of their clinical training. The expansion of such a program of undergraduate teaching is now receiving serious consideration and may be the first step in the realization of a significant advance in cancer education. One of the

weakest links in the program of prevention and early diagnosis in cancer is the lack of adequate training of medical students in this subject.

The organization of a special department of neoplastic diseases in medical schools to correlate the various aspects of cancer would do much to obviate this deficiency and prepare the future general practitioner for some of the hazards of cancer diagnosis.

Every year witnesses some advancement toward the solution of the cancer problem. Yet viewed in the light of our present knowledge there seems much still to be accomplished. The future possibilities of cancer prevention are still undeveloped. We have a waiting list of approximately 6000 in this area alone who wish to be examined, and I know this same condition exists in the Chicago, Philadelphia, Pittsburgh and other Clinics. The demand by the public for such service seems very great yet the response on the part of physicians falls far short of the goal.

Specialized cancer education for the medical profession is in its infancy and wholly inadequate efficiently to equip the general practitioner to cope with early diagnosis in cancer. Until treatment, research, education and prevention in cancer have been brought to their full development and work in close coöperation with each other, there will not be any definite decrease in the mortality from this disease.

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TUMORS OF THE EYE AND ORBIT*

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UNCONTROLLED growths of cells without biologic purpose involving the eye are, in the main, not unlike those found elsewhere in the body. In the beginning they have a special local importance and the undifferentiated types have a general significance as well. The relative frequency of benign and malignant tumors in the eye may be explained by the presence of many mixed, interrelated tissues, each dependent on the other, which compose this highly specialized organ. Since the eye lends itself well to examination, tumors are usually observed in their very early stages. But because anatomical or inflammatory changes frequently resemble growths they are not always distinguished and treated promptly and properly.

The tumors which may arise in the eye and its adnexa, and in the orbit are innumerable and discussion of them is quite beyond the time allotted for this presentation. I shall devote the period to recent contributions to the subject and to controversial issues. My material will be presented simultaneously with the showing of illustrations of a number of tumors which were drawn from cases seen at the Eye Institute and with slides indicating the value of the x-ray in the study of expanding lesions of the orbit.

Congenital *naevi* of the bulbar conjunctiva are open to discussion on two points: first, their frequency as the origin of malignant growth and secondly, their relation to benign melanomas of the interior of the eye. The naevus is of neural origin, derived from the end apparatus of the sensory nerve, is usually pigmented and may not be apparent at birth. It is essentially a benign neoplasm which grows very slowly, passes through a long period of quiescence and may eventually atrophy. According to most authors a sudden stimulus to rapid growth may occur, in which event the tumor acquires a capacity to become highly

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malignant. The distinguishing cell of the mole is the large naevus cell which is round or polygonal in shape. These cells may present a gland-like appearance and are found beneath down-dipping prolongations of the surface epithelium. The melanin found in the growth is mainly intracellular, more abundant near the surface and in the central-lying epithelium. Cysts are very frequently present.

The nature and ontogeny of the naevus cells have given rise to much controversy. Masson's[1] recent exposition of the subject that these cells are neither epithelial nor mesoblastic in character but neuro-ectodermal and associated with the terminal neural apparatus is now generally accepted. They are seen associated with the medulated and non-medulated nerve fibres, ending in the skin in Meissner's corpuscles. Some of these cells, less closely associated with the nerves produce pigment (melanoblasts). Wherever a discussion of the naevus is found, one encounters reports of malignant melanoma arising in the naevus. Reese[2] wrote in 1943 that he had never encountered this circumstance in the eye and in a study of those cases reported in the literature, only two cases could be found which could be identified definitely as cases of melanoma which arose from a pre-existing naevus. He believes that precancerous melanosis may have been mistaken for the mole or that the melanoma was acquired and malignant from the beginning.

The melanomata seen in the iris or choroid are also regarded as naevi but since true naevus cells are not found in these lesions, doubt exists that they are the same. The spindle cells without the processes characteristic of choroidal chromatophores have been regarded as atypical naevus cells. The many references to malignancy arising in naevi in the literature apply to the pigmented spots of the iris or choroid. Reese[3] has called attention to the frequency of pigmented spots or freckles in the iris in cases of malignant melanoma. Many others have written of the coexistence of benign melanomata of the choroid with a uveal sarcoma. This has occurred sufficiently often to justify the periodical examination of eyes with benign melanomata. Duke-Elder[4] has stressed that the occurrence of glaucoma in an eye with a naevus should always be looked upon with the greatest suspicion. By naevus here he is again speaking of a melanoma. Incomplete excision of a melanoma may lead to rapid and uncontrollable growth, as was the circumstance in the case reported by Greenwood.[5]

Reese[2] has described acquired *precancerous melanosis* as a diffuse,

non-elevated pigmentation with a granular and ofttimes dull appearance of the conjunctiva, appearing usually during the fifth decade of life and showing malignant change in 5 to 10 years. Occasionally the melanosis is malignant from the beginning. It may become so diffuse as to involve almost all the bulbar and palpebral conjunctiva and adjacent skin without causing any localized tumor mass.

Acquired precancerous melanosis has distinguishing histologic characteristics in the benign and in the malignant phase, is radio-sensitive in the precancerous stage and radio-resistant in the malignant. Patients observed by Reese in the malignant stage died. Early exenteration is the treatment advised. Precancerous melanosis should not be confused with 1) congenital melanosis of conjunctiva, 2) melanosis oculi and 3) naevi.

From the several papers which have appeared in the literature in recent years on the prognosis in *malignant melanoma* of the uvea, one gains the impression that this tumor is not as malignant as it was formerly thought to be. Certainly it is not to be compared in malignancy with those arising elsewhere in the body. In their study of 500 malignant melanomas of the eye followed over a period of five years or longer, Callender, Wilder and Ash[6] of the Army Medical Museum found a mortality of 48 per cent. In 200 cases followed ten years or more, the percentage of deaths rose to sixty-six. They found the average duration of life following operation to be forty-six months. These authors have made a significant contribution to pathology in their study of the malignancy of the various types of malignant melanomas according to cellular structure, reticulin and pigment content.

The single spindle cell variety shows a relatively low degree of malignancy and a heavy fibre content is also evidence of a low degree of malignancy. An increased degree of malignancy is associated with the epithelioid type of malignant melanoma. It was suggested that an increase of malignancy is associated with increased pigment content. Thus, on the basis of microscopic appearance, an opinion can be expressed by the pathologist on the degree of malignancy indicated by the composition of the tumor.

A notable contribution to the treatment of *retinoblastoma* by radiation has been made by Martin and Reese.[7] In 11 of 24 cases of bilateral retinoblastoma managed by them vision was preserved to some degree by their technique. These authors enucleated the eye with the

more advanced tumor and treated the remaining eye by fractionated doses of roentgen ray totalling 8000 r to each of two portals; 2½ cm. cones were employed and aligned in such a manner as to exclude the anterior segment of the eye from the field. After the tumor atrophied under the treatment the contained calcium became increasingly apparent and finally could be seen as a small bag of concretions. The surrounding retina formerly occupied by the tumor appeared as an atrophic area with proliferation of pigment. This treatment is applicable in those cases in which the tumor is localized to relatively small areas of the retina.

That the calcium content of retinoblastoma may be utilized in the differential diagnosis of the tumor was advanced by Pfeiffer[8] who found calcium granules in 80 per cent of all of the tumors studied histologically and roentgenographically. Shadows of calcium have never been demonstrated in conditions resembling retinoblastoma.

Aside from epitheliomas of the eyelids which are superficial and easily recognized, *tumors of the orbit* usually displace the eye, or in other words, produce exophthalmos. The diagnosis of tumor of the orbit then involves a study of exophthalmos which may be due to a number of conditions other than hyperthyroidism and tumor. Exophthalmos produced by tumor is usually unilateral but here again the unilateral displacement of the eye is as frequently produced by other conditions. In a series of 200 consecutive cases of exophthalmos studied by roentgenography[9] the displacement of the eye was caused by benign and malignant tumors and cysts in seventy-two or 36 per cent of all cases. In only 10 per cent of all the cases was exophthalmos produced by a malignant tumor. There were thirteen primary intraorbital neoplasms, eight sarcomas and five mixed tumors of the lacrymal gland in the series. The orbit was involved secondarily in eight cases in which five derived from malignant neoplasm arising in the nasal fossa or sinuses, two from basal cell epitheliomas and one from a myeloma. In the diagnosis of orbital tumor, therefore, a vast number of other conditions have to be excluded. This can best be done by roentgenographic study. In this series of 200 cases there were positive roentgenographic findings in nearly 70 per cent and in 42 per cent of all the cases the findings were diagnostic. Six conditions, that is, retention cyst of a paranasal sinus, meningioma, craniostenosis, neurofibromatosis, deformity of the orbit, and glioma of the optic nerve made up one-third of all

the cases and invariably produced changes which are indicative in the x-ray film.

One of the most confusing conditions in the diagnosis of lesions of the orbit which, in addition, is one of the most common single causes of exophthalmos, is chronic granuloma or so-called *pseudo-tumor* of the orbit. The cause of this inflammatory involvement, which is more frequently unilateral than bilateral and which tends to run a self-limited course, is not known. Lymphoblastoma has been associated in a number of cases. Fortunately, chronic granuloma can be differentiated in most cases by the history and clinical findings and absence of x-ray changes. The onset of this condition is rather sudden, the eyelids are edematous, the exophthalmos is frequently severe, a palpebral mass may be encountered and, in many cases, there is interference with ocular motility. Reese[10] analyzed 30 cases of the literature and found that in 50 per cent of them the patient had been subjected to exenteration of the orbit for supposed malignant neoplasm. Lewis[11] stressed the difficulty of getting correct diagnoses from many general pathologists who, he found, are more likely to report that the biopsy tissue represents a true neoplasm.

The paper by McGavic[12] on "*lymphomatoid diseases involving the eye*" deserves notice for its calls attention to a complex tumor of unknown pathogenesis with different criteria for histopathologic and hematologic diagnosis of the recognized entities. Failure to recognize lymphomatoid diseases as everchanging processes requiring repeated biopsies of tissue and repeated studies of the blood through the clinical course has delayed the adoption of a uniform classification of the many types of abnormal lymphoid reactions. McGavic's paper dealt with 21 verified cases in an effort to contribute toward a working basis for the management of patients with lymphomatoid diseases of the eye. He classified his cases as to histologic type. The three most important types given were simple lymphoma or lymphocytic celled lymphosarcoma, giant follicular lymphosarcoma and reticulin cell lymphosarcoma. Repeated differential blood counts in studies of the bone marrow were necessary to rule out or demonstrate leukemic changes.

The general outlook for patients with lymphomatoid disease is poor. With treatment approximately 15 per cent survived a five year period of observation. Lymphomatoid growths are radiosensitive but this quality must be differentiated from radiocurability. A given lesion

may be treated to complete regression but this does not preclude the appearance of tumor masses in other sites. The use of radiation in the region of the eye is, of course, a threat to the eye.

McGavic reported one case diagnosed as pseudo-tumor (granuloma of the orbit) on biopsy specimen which subsequently developed generalized lymphadenopathy. On biopsy of a supra-clavicular lymph node the diagnosis of a reticulin celled lymphosarcoma was made. In reviewing the case, McGavic stated that the disease was a changing lymphomatoid process but first appeared to be inflammatory.

I have a patient under observation at the present time with exophthalmos which was diagnosed pseudo-tumor on biopsy specimen, but who has diffuse lymphadenopathy of the adjacent preauricular and cervical nodes and enlargement of the maxillary glands which, I suspect, will be proved to be lymphosarcoma. So far, this patient has shown some local response to radiation of the orbit.

Davis'[13] paper on "*Tumors of the Optic Nerve Associated with Recklinghausen's Disease*" is notable for its splendid review of the subject of tumors of the optic nerve. Gliomas and meningiomas are virtually the only primary tumors of the optic nerve. "The glial tumors start with an abnormal proliferation of the adult types of neuroglia of the nerve stem. After varying periods of growth the abnormal neoplastic neuroglia cells penetrate the pia with the formation of a gliomatous tumor in the sheath. Proliferation of the mesothelial cells of the arachnoid follows the glial penetration of the pia with the formation of a tumorlike mass in this portion of the nerve sheath. Later, intermingling of the proliferated cells from these two areas produces a complex histologic structure. the precise nature of which it is difficult to interpret unless earlier stages of the growth have been studied because histogenesis of the neoplastic cells has not been determined." Such types as spongioblastoma, spongioneuroblastoma, astrocytoma and oligodendryocytoma have been reported. According to Davis the outstanding feature of the neoplastic cells was excessive fibre formation within as well as without the nerve stem. The predominant cell types were astrocytes so that he designated the five tumors of his series associated with Recklinghausen's disease "astrocytomas."

Further, on the basis of his experience, Davis stated that tumors of the optic nerve probably belong to a systemic disease as originally suggested by Emanuel which is borne out by the simultaneous appear-

ance of multiple lesions in the central and the proliferated nervous system, by the fact that the tumors are bilateral at times, and further by the fact that multiple involvement of the nerve has been reported. The slow rate of growth and the relatively benign nature of the tumors are characteristic of other lesions associated with this syndrome.

Cushing's[14, 15, 16] papers on meningiomas give a concise understanding of the origin and behavior of this less common tumor of the optic nerve. Most meningiomas arise within the cranium but since cell clusters of the archnoid are found in the sheath of optic nerve, they may be primary in the orbit. The case of Friedenwald[17] was demonstrated to have arisen within the orbit. One patient in my series with a very large meningioma of the orbital portion of the optic nerve showed a normal optic canal and, at this time, fifteen years since the operation, continues to be well and to have normal vision of the other eye.

Because of the variety of usually unsuitable names which have been applied to various tumors, great confusion exists in the literature in regard to most. Ophthalmologists have persisted in the use of the term "cholesteatoma" for that type of congenital growth which presents a glistening white, nodular appearance and known as "tumeur perlee" by the French. Since this congenital tumor, arising occasionally in the orbit and more frequently within the cranial cavity, appears to have a different origin from those cholesteatomata found associated with middle ear disease, it seems pertinent that a distinction be made.

The indispensable criterion for the diagnosis of these lesions is the microscopic demonstration of epidermoid elements making up the walls of the tumor. We are logically forced to name the growth from its indispensable character and should use the term suggested by Critchley and Ferguson,[18] that is, *epidermoid*. The usual gross appearance of these tumors is that of an irregularly lobulated, white, opaque, glistening ovoid or spherical mass, varying from 1 or less to 10 centimeters in diameter. The tumor is firm but friable and breaks easily on moderate pressure. On section it often gives the appearance of an onion, owing to its laminations. It may leave a fatty stain on the knife and a fatty rancid or fatty odor may be detected. The very old tumors become necrotic, especially in the center and cholesterin crystals are found in this necrotic debris. It is avascular and easily removable.

In the opinion of Horrax[19] the difference between epidermoid and dermoid tumors depends upon the depth of the cell layer from which

the embryonal rest arises. If the cells are derived from the epidermis the resulting tumor is an epidermoid. If, on the other hand, the original cells arose from the dermal layer the tumor contains hair, sebaceous glands and other dermal elements and should be termed "dermoid." This opinion is opposed to that of Boestrom who felt that not the depth of the cell layer but the embryonic age of the cell rest was the determinant. The more primitive and undifferentiated the cells of origin of the tumor, the more likely they are to give rise to dermoid rather than epidermoid tumors. The latter must, therefore, arise fom inclusions occurring later in embryonic life. Clinically the dermoids frequently bring about symptoms at an earlier age in the life of the patient than the epidermoids.

The cholesteatomas associated with infection of the middle ear cavity consist mainly of epithelial debris with fat, granulation tissue, leukocytes and cholesterin crystals and may simply be the accumulated heaping up of excessive desquamation and reaction to inflammation. Erdheim,[20] however, reported a typical epidermoid in the middle ear unassociated with infection. It may be that under the stimulus of the inflammatory process the back growth of the meatal epithelium through the tympanic cavity gives rise to dermoid formation. It is possible, on the other hand, that the tumor may be present in the middle ear as an epithelial rest and its presence predisposes the ear to suppuration so that the infection and tumor formation are discovered in association with each other.

Adrenal sympathicoblastoma or neuroblastoma[21] is one of the commonest causes of exophthalmos in children and might well be mentioned here. This malignant tumor, which is invariably fatal, arises from an embryonal nerve cell derived from neural ectoderm and is the primary sympathetic cell. This tumor has the same embryonic origin as the medulla of the suprarenal gland and the adjacent sympathetic ganglions and may arise from either. The neoplasm arises more frequently from adrenal medulla but it may arise from embryonal sympathetic cells or sympathicoblasts anywhere in the body.

The tumor consists of small cells which have hyperchromatic nuclei, are polymorphous, contain little cytoplasm and lie in dense, new-formed connective tissue. The cells with delicate fibrils are usually densely packed or grouped to present the appearance of an embryonic ganglion of the sympathetic nervous system (Wahl). The cells may also form

a rosette, arranged around a central mass of fibrils. Among these cells, larger round cells may be found, with larger, pale, vesicular nuclei and a larger rim of cytoplasm. These were called embryonic ganglion cells by Lewis and Geschickter. Rosettes are found in approximately 50 per cent of cases and these and/or fibrils should be present for a positive diagnosis according to Leinfelder. Verhoeff wrote that these rosettes are quite different from the rosettes of retinoblastoma.

The ocular signs are preëminent in the diagnosis of the tumor. The occurrence of ecchymosis of one or both lids alone or associated with exophthalmos not only should suggest adrenal sympathicoblastoma but may be diagnostic of the disease. Sturtevant and Kelly emphasized the fact that ecchymosis of the eyelids and proptosis in infants and children should arouse suspicion of adrenal neoplasm. Seefelder stated that these two ocular signs are diagnostic of the source of the orbital metastases. In addition, papilloedema and temporal tumor are frequently found. The metastases to the orbit are probably hematogenous. In the "Pepper type" the outstanding symptoms are local and involve only the lower and periaortic lymph nodes giving rise to abdominal signs, especially to a large liver and metastases to various parts of the skeleton. The average age of cases of the Pepper type is two years and of the Hutchison or cranial type is four to five years.

Because of the limited time and the vastness of the subject assigned to me I could scarcely do more than mention several tumors which seem of special interest at this stage in the development of our knowledge. The reason for choosing these particular neoplasms is apparent in each discussion. But by these reasons, many other tumors could have been included. Malignant melanoma and retinoblastoma required discussion not because they are the commonest tumors of the eye but because recent advances have been made in our understanding and management of them. The series of cases of exophthalmos mentioned seems a fair sample of the great variety of conditions which may cause displacement of the eye. With the x-ray we are able not only to diagnose many causes of exophthalmos but also to differentiate, with some degree of accuracy, at least a few of the various tumors which occur in the orbit.

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SOME PUBLIC HEALTH IMPLICATIONS OF SELECTIVE SERVICE REJECTIONS*

The A. Walter Suiter Lecture

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I APPRECIATE very much this opportunity to discuss with this group some implications of Selective Service findings to the public health.

The New York Academy of Medicine is outstanding among professional groups for its scientific thinking and for its promotion of scientific medicine. Your organization is especially to be commended for its encouragement of postgraduate education and of public education on the advances as well as the problems of medicine. It has led the profession in emphasizing the preventive aspects of medical practice and the relation between public health and clinical medicine. The Committee on Medicine and the Changing Order reflects your consciousness of the problems associated with maladjustments between the science of medicine and the application of medical knowledge.

It is a particular pleasure to present as the subject of a Suiter lecture this discussion of the most recent findings concerning the health of our young people. Doctor Suiter's long career was marked by great interest in public health affairs. It is my conviction that our success in attacking the public health problems which lie before us will depend in large measure upon similar interest and coöperation on the part of large numbers of physicians.

There has been much discussion concerning the accuracy of Selective Service reports, as well as of their worth in evaluating the state of national health. I would like to review these data from a statistical viewpoint for two purposes: (1) to indicate their value as indices of health needs and achievements, and (2) to draw certain inferences with regard to future public health planning.

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The traditional objective of public health is disease prevention. Through the years, public health activity has been concentrated primarily on certain acute conditions in which the causal factors and the onset of disease are immediately related in time. Some of these efforts have been markedly successful. Typhoid fever, diarrhea and enteritis, malaria and yellow fever have been greatly reduced through the application of environmental sanitation; diphtheria and smallpox by immunization; pellagra by increased knowledge of nutrition. But many widespread causes of disease and disability among the population have remained untouched. Gradually, we have come to realize that public health responsibility must extend to the prevention or early discovery of diseases and conditions which are insidious at onset. This concept is developing as one of the goals of preventive medicine. Consideration of Selective Service findings points to some of the steps to be taken toward achieving this goal.

In any evaluation of Selective Service findings, rejection rates must be a first consideration. Examination standards changed frequently during the course of the war. Hence, rejection rates varied greatly. We find, for example, that in the pre-Pearl Harbor days of Selective Service (November 1940 through September 1941) more than half of all men examined (52.8 per cent) were rejected for military duty. The rates decreased markedly following the declaration of war, as the need for manpower become intensified. By January 1943, they had reached a low of 28 per cent. With the calling up of older men and previously rejected men during that year, the rates rose gradually to 42 per cent, but by May 1944, they had dropped again—that time to 31 per cent. It was in this last period, you will recall, that the minimum age for military service was lowered from 21 to 18 years, and that unusually heavy quotas were levied on local boards. By the middle of the year, however, the rates began to increase steadily, until by November they had reached 45 per cent.

These figures I have just given by no means show all the fluctuations in rejection rates which resulted from the various changes in qualifications for military service. Rather, they illustrate some of the difficulties involved in evaluating the level of national health in terms of acceptance or rejection for military duty. In short, the gross rejection rates tell only the proportion of individuals who did not qualify according to the standards of one particular period.

My conclusion is by no means new. Leonard G. Rowntree, Medical Director of Selective Service, in 1944 told the Senate Subcommittee on Education and Labor that rejection rates are dependent on too many factors to be used as criteria in adjudging civilian health.

"The incidence of all recorded defects," he said, "is a better index of the health picture. The latter is only limited insofar as all defects may not be recorded."

There is no question that prevalence rates are better than rejection rates for evaluating national health. To the limitation pointed out by Dr. Rowntree, however, I would add the differences in examining techniques at the various examination centers, the idiosyncrasies of the examining personnel and the attitudes of the examinees.

A comparison of Selective Service findings for November 1940, through September 1941, with that for April 1942 through December 1943, illustrates the effects of these factors on the reported prevalence of disease and disability.

In the first report, an average of about one and one-half defects were recorded for each man examined (1,583.3 per 1,000); in the second, one defect for each man. Between the two periods, the coding procedures were changed so that a complete list of defects was not always available in the second period. Since the defects were summarized in order of significance, the limitations of coding would result in the omission of less significant defects and account, at least partly, for the drop in rate.

The effect of such omission, together with the other factors I have mentioned, can be gauged by a comparison of rates for specific kinds of defects. For example, in 1940-41 when the coding was more complete and when flat feet were a cause for rejection, foot defects, with an average of 172 per 1,000 men, led the list of disabilities. By 1942-43, however, minor foot ailments were considered unimportant, and only 55 per 1,000 men were recorded.

Reporting of dental defects followed a similar pattern. In the first period these defects averaged 168 per 1,000 men and were second highest among all defects. In 1942-43, the incidence had fallen to 113 per 1,000 examinees. This drop probably was due to the failure of examining personnel to record all cases of carious or missing teeth, or to give dental defects sufficient precedence for inclusion in the coding, since these defects no longer were cause for rejection.

Like decreases also occurred in the prevalence of throat diseases, skin diseases and defects of the abdominal viscera, as the need for military personnel grew more urgent and examining physicians tended to concentrate on the more serious systemic defects.

While a great increase in the reported incidence of tuberculosis took place in the later period, the rise—from 10 per 1,000 men in 1940-41 to 19 in 1942-43—may be accounted for largely by a change in examining procedure. Chest x-rays did not become an examination routine until 1942, and it is reasonable to suppose that many cases of tuberculosis among pre-Pearl Harbor inductees passed through examining stations undetected.

On the other hand, reports of many important defects remained fairly constant in both periods. Eye defects, for example, varied only slightly. We also find little change in the reported prevalence of neurological diseases or of diseases of the lung (other than tuberculosis), kidney and ear. The answer seems to be that a large proportion of conditions in these groups of defects were outright causes for rejection. Therefore, reporting necessarily was fairly complete.

Mental disease, which was high among the more serious defects for both periods, was found in 68 out of every 1,000 men examined in 1942-43. Leading the list among these diseases were psychoneurotic disorders, psychopathic personality and grave mental or personality disorders. Since serious attention was given by examining physicians to evidence of mental disease in both periods, and since reports for the periods are consistent, it could be concluded that reporting and coding of the incidence of mental disease were fairly accurate throughout the war.

I have presented these comparisons to bring out the fact that the order of defects may have been closely associated with prevailing regulations for the rejection or acceptance of examinees for military service.

As we review these figures, we find little reason to doubt that the findings for 1940-41 more clearly approach the actual prevalence of defects, although how close that approach is can only be guessed. There also seems reason to believe that the figures present a fair picture of the prevalence of major defects—with allowances made for variations in examining techniques, in the judgment of examining physicians and in the recording and coding of defects. It likewise appears obvious that the many factors which influenced the recognition and recording of

secondary defects detract from the accuracy of the reports.

None of these factors, however, obscures the enormous volume of defects which were found to exist among Selective Service registrants. Errors are, largely, errors of omission. Therefore. even the highest rates probably understate the true situation.

To students of national health problems, these findings represent no new discovery. The wide publicity and attention which Selective Service findings have attracted results, probably, from the quantity of defects reported. Health data have never before been obtained on such large numbers of young men; but numerous surveys have revealed the same basic facts.

An example of these surveys is to be found in the study conducted in 1941 among about 150,000 young boys and girls between the ages of 16 and 24 years who were employed by or seeking employment with the National Youth Administration. Physical examinations were conducted by private physicians, and persons requiring treatment were referred to physicians, clinics, hospitals or health agencies. The survey, which covered both urban and rural youth in 47 States showed that about one-third of all those examined had some health defect which placed some kind of restriction on the kind of work they could do. Three per cent of all youths examined were judged to be either temporarily or for a prolonged period unfit for any regular NYA employment.

But while only one-third were limited in their employability, about nine-tenths of the entire group were found to have one or more health defects. One hundred and sixty-six impairments were found for every 100 youths examined. Dental defects were highest—84 for every 100 youths. Eye defects were found to exist in 36 per cent of the group; bad tonsils in 19 per cent. Organic heart lesions were discovered in 2.5 per cent; orthopedic defects in 5 per cent; kidney conditions in 8 per cent; hernias in nearly 2 per cent.

As you will observe, the findings of this survey bear great similarity to Selective Service reports.

Both of these sources of information on the national health status cover only the younger segment of the population. There have been other studies, however, which have been directed to all age groups. The largest of these was the National Health Survey of 1935-36 in which an effort was made to determine the incidence and duration of illness over a period of time. While the study included analysis of all

types of illness, its findings on chronic diseases seem particularly pertinent since these, for the most part, are the serious diseases which attack persons of all ages. It was estimated, on the basis of this survey, that 25 million persons suffer from some disabling or non-disabling chronic ailment.

All of these surveys reiterate the indications of Selective Service findings that there is an enormous amount of defects among the population. While we are aware that rates based on Selective Service reports do not give us a complete accurate measure of the prevalence of defects, they do provide a fairly clear picture of the amounts and kinds of defects existing in our young men. It would seem appropriate, therefore, to compare these data with those collected in World War I in order to determine what change has taken place in the prevalence of physical impairments.

Selective Service figures for 1917-18 show that 662 defects per 1,000 men were recorded in contrast to 1,000 defects per 1,000 men in 1942-43, and 1,583 in 1940-41. Just as we found the differences between 1940-41 and 1942-43 to be due largely to the coding of the diseases, so it must be suspected that failure to record many minor defects in World War I accounts for a major part of the difference in the records of the two wars. In addition, differences in the medical terminology of the two periods make it difficult to determine the exact classification of defects in many instances. It must be remembered also that diagnosis of a number of diseases underwent refinement in the interval between wars.

As a result, although wide variations in some general groupings will be noted, in specific categories, where similarity in terminology permits comparison in the two periods, differences are not always as great as might be expected. Among diseases of the eye, for instance, 61 defects per 1,000 men examined were found in 1917-18, against 123 in 1940-41. Yet, for bilateral and unilateral blindness—an easily defined defect which can be assumed to have been reported in the same category for both wars, the difference is small. Similarly, there is only small variation in recordings of the incidence of trachoma, and the slight decrease noted in 1940-41 may point to some public health accomplishment in the conquest of this disease.

Increased medical knowledge is a factor that cannot be overlooked in comparing the incidence of a number of defects. This is particularly

true of asthma, cardiovascular disease, and venereal disease. Since diagnosis of these conditions is much more frequent throughout the population today than twenty years before, it follows that recognition of the diseases among a selected group in 1940 should be greater than in 1917.

Variations in the incidence of tuberculosis are of especial interest, since examination procedures in effect in 1940-41 more closely approximated those of 1917 than in any other period of World War II. Moreover, the decline in prevalence rates for the two periods (24.7 and 9.7 per 1,000 men examined) bears fairly close resemblance to the drop in the national tuberculosis mortality rate between 1930 (113.1) and 1940 (45.9). Since the reported incidence of tuberculosis increased markedly with the inauguration of chest X-rays as an examination routine—moving from 10 in 1940 to 19 per 1,000 men in 1942-43—it seems evident that considerable tuberculosis went undiscovered both in 1917-18 and in 1940-41.

Loss of members is an obvious defect that cannot be influenced by any of the elements affecting reporting or diagnostic procedures; therefore, these figures can be accepted at face value. The great similarity in rates for this type of defect, as well as for others which are easily observed, leads to the conclusion that the prevalence of a number of defects in 1917 was probably about the same as in 1940-41.

The comparison does not reveal evidence of great improvement. While slight decreases may be indicated in the incidence of a few defects and diseases over the twenty year period, they are too small to be proof of progress.

This picture is markedly different from that presented by a comparison of mortality data for the same two periods. The national mortality rate decreased 3.1 per cent in the interval between wars. Among young men 20 to 34 years old, the death rate has gone down nearly 30 per cent. We have seen, however, that this reduction in mortality is not associated with a corresponding reduction in impairments.

The first conclusion, then, that we can draw from these data is that Selective Service findings, based on physical examinations, provide a valuable supplement to mortality figures as an index of national health. Statisticians have long been aware that death is by no means a sufficently comprehensive measure of the extent of disease or impairment. Regardless of the accuracy and completeness of mortality statistics, they

furnish direct knowledge of only a few of the health problems of the population and, at best, inferential information about some others, In order to obtain actual information on the extent of health problems, then, it would seem essential that we establish the mechanism for maintaining a continuing health inventory of the population. To a limited degree, Selective Service findings for World War I and World War II have provided such an inventory. They have pointed to the weaknesses of our past methods for early diagnosis and treatment.

During the decades between wars, health department activities have been increasingly concerned with the development of personal services. This development is illustrated by well-baby clinics, by maternal and child health work, by dental health programs. Selective Service findings, however, show that the evolution from the relatively restricted functions of quarantine and sanitation has not been rapid enough to meet the public health needs of the population.

Perhaps if we were to cling to the narrower approach to public health work, we would claim that defects uncovered by Selective Service fall outside our responsibility. If we were to cling to a limited definition of preventive medicine, we would say that for a majority of these conditions nothing can be done. We would say that even with fluorination of water supplies, only about 50 per cent of carious teeth in children could be prevented. We would point out that we do not know how to prevent most heart disease and that, particularly, we have no methods of preventing or controlling rheumatic and congenital heart defects. We would contend that most hernias are non-preventable.

Such a concept, however, is not compatible with the modern scope of public health services. While we fully recognize the importance of environmental controls and of protecting the individual when the environmental control is not adequate, we are convinced that effective preventive public health effort also must be directed toward the prompt detection of disease in the individual. Such detection should come at the earliest possible stage. For many defects, this detection must come early in childhood if it is to be effective. This has been recognized, in theory at least, by health authorities for many years. In fact, the school health examination represents nearly the only existing mechanism for a continuing health inventory.

In many of our largest communities we have seen the development of school health programs designed to safeguard and improve the health

of our youth. On the basis of Selective Service findings, it is obvious that these programs have failed to do a complete job. Some indications of how they have failed can be seen from a study conducted by the Public Health Service from data on the school health programs of one community over a period of twenty years. Comparisons were made between the physical status of selectees from that community and the physical status of those same youths when they were children some fifteen years earlier.

The findings of this study indicate that many of the physical defects responsible for the rejection of men by Selective Service in World War II were evident in their incipiency when these young men were children. A relatively large number of the selectees who were rejected for defective teeth and vision, for example, gave evidence of those defects when they were in elementary school. Many cardiovascular and hearing defects responsible for rejection were detected in childhood.

The findings also demonstrate that efforts directed toward school children can be successful in finding many types of defects. The organization of the schools, where all the children are together at one time, permits us to carry out systematic procedures with minimum effort and personnel. If properly directed, school health examinations can lay the groundwork for preventing the development of many disabilities which were revealed by Selective Service examinations.

However, even if every community made comprehensive school health examinations, only a relatively small part of the problem of discovering defects would be met. After all, the total school enrollment accounts for only about 15 per cent of the population. Some additional method would have to be devised to determine the actual amount of defects among the remainder of the people.

From a public health standpoint, the mechanism for a health inventory should be directed at early detection. This detection of disease is as vitally important to an effective program of prevention as a program of diphtheria immunization is valuable to the prevention of diphtheria. Early detection may not prevent the development of some diseases as effectively as the antitoxin prevents diphtheria. But it would give the physician an opportunity to apply all his skills at a time when they would be most successful in alleviating the conditions or retarding their disabling or fatal effects. Much ill health can be traced to our fail-

ure to develop the means of tackling the whole problem of disease at the time of inception or in the early stages.

Obviously, we must rectify this failure. I do not pretend that the task confronting us is easy or can be accomplished overnight. Nor do I think we can expect our present official public health agencies to offer the whole solution. Certainly, the health officer must have an important role in such an undertaking. But we must look also to the private physician to implement a program directed toward the early detection of disease.

In a recent monograph on "Medical Education and the Changing Order," published by your Committee on Medicine and the Changing Order, Dr. Raymond B. Allen writes: "Physicians of the future must be capable of taking their places as responsible leaders in the community and of viewing the problems of medical service dispassionately. Unless they recognize the right of every person to adequate medical service, the medical profession will degenerate to the level of a trade in which, as tradesmen, physicians will be concerned merely with the techniques of their trade. The medical profession cannot assume full responsibility for supplying complete medical service everywhere; . . . It is under obligation, however, to cooperate fully with voluntary and public agencies so that together they may create the economic and social conditions which make possible an adequate medical service for all."

During the war we witnessed this type of participation, particularly with respect to Selective Service. In peacetime, the same participation—to a lesser degree, perhaps—is observed in the clinics of health departments. But the development of a mechanism directed toward the early detection of defects will require greater participation in community activities and greater coöperation with health agencies on the part of private practitioners than has existed to date.

The value of early detection of disease and defects has long been recognized. For many years, insurance companies have stressed the benefits to be derived from annual physical examinations and the prompt follow-up of early indications of disease. These companies have conducted extensive campaigns to convince their policyholders of the wisdom of such an approach to the problems of illness. It has been claimed that mortality rates have been reduced by these activities.

More recently, organizations established for the control of cancer,

tuberculosis, heart disease and other diseases have spent millions of dollars in nation-wide education programs to stimulate the public to watch for the early symptoms of these diseases. The Public Health Service, in coöperation with State and local health departments and the medical profession, has promoted the mass radiography technique for discovery of tuberculosis, and has assisted in its utilization on a community-wide basis.

Also worthy of particular note in programs for the early detection of disease are the Strang Memorial Clinic of the New York Infirmary and the clinics of the International Cancer Research Foundation. In the complete physical examinations primarily designed for the early diagnosis of cancer, many other conditions needing medical care have been discovered and the persons examined have been referred to private practitioners for treatment of the conditions detected.

Two months ago, I had the opportunity to observe at first hand the work being done at Peckham, London, toward the early discovery of disease. The Peckham experiment—as you probably know—is a bolder effort to tackle the problems of community health than has been attempted in this country.*

The origin of the Peckham plan goes back to 1926 when a small group of scientists and of young married people agreed to organize a health and community service. This service was to give the scientists an opportunity to make continuous studies of the growth and health of normal family groups. To the family groups it was to provide an opportunity to keep fit and ward off sickness before they became incapacitated. Each family agreed to pay a small weekly fee to support the service.

Over the years, membership has grown to around 2,000 families, and the small building which first housed the health center has been replaced by more commodious quarters. The development of recreational activities has been one of the methods employed to attract membership and to make the center a focal point in community and family life.

The primary accent on health, however, has been retained. A physical examination, or "overhaul" as the British call it, for each member of the family is a part of the enrollment procedure. This examination

* The project had to be discontinued for a time during the war but is now in operation again and building up its membership.

is repeated at regular intervals. In each case, the examination is complete, including laboratory tests, and is followed by a family consultation. As a part of the examination routine, all infants are seen each week, children 3 to 4 years old are examined every month, and school children every six months. No actual medical therapy is practiced, but members are put in contact with the proper agencies responsible for the technical part of rehabilitation.

These examinations are directed toward the discovery of defects and their relation to the physical efficiency of all family members in terms of the effect of health on capabilities for individual, family and social life. They have emphasized the importance of the pattern of growth and the need for continuous observation, and have thus developed valuable material for biological research.

Since the enrollment of the Peckham Health Center consists of "average" people who live in an area which has no particular social problem, British health authorities were somewhat amazed at the findings reported in 1940 on the physical examinations of 3,900 individuals of all ages in some 1,200 families. Ninety-one per cent were found on first examination to have some physiological defect, deficiency or aberration. In about two-thirds of these people, the disorder was masked by compensation, and therefore, the individuals considered themselves well. In only 32 per cent was the observed defect accompanied by disease.

In a report of these finding at Peckham, comparison was drawn with our own Selective Service reports.

"In 1941," the report states, "among the first batch of American recruits, 50 per cent were rejected as being unfit for admission to the U. S. Army, and in the opinion of authorities it is unlikely that more than 10 per cent of the rejects could be made fit for service. This indicates that the disorders found were not of a merely transitory nature, and leads to the conclusion that our findings are not peculiar to Peckham or even to the British Isles. It is a general, not a local phenomenon that we have encountered."

Let us examine more closely the lessons we can learn from Peckham and from efforts here at home to develop a community-wide approach to the problem of early detection of disease. In each instance, some method is employed to provide a center to which people can go for physical examinations. In each of these projects, an effort is made to educate individuals to the importance of finding out what is wrong

with them and doing something about it. In each instance, too, an attempt is made to utilize the facilities and skills of physicians in the community to discover and to correct impairments. At Peckham there is also a new note—the development of continuing records on the growth and health of the individual as part of the social unit.

In these attempts to stimulate early diagnosis and treatment of disease and defects, it seems to me we are developing a new role for the physician, a role which combines some of the functions of the health officer with those of the family doctor. To be effective on a community-wide scale, however, three things are necessary: (1) Adequate diagnostic facilities must be available for the physicians of the area; (2) all health information on each individual examined must be brought together and integrated; and (3) some means must be found to assure that each person gets the medical services needed to correct the defects revealed by the health examination.

I believe the creation of community health centers would greatly facilitate the early detection of disease in the population. Here, assembled in one place, could be located adequate diagnostic facilities for the use of all physicians in the area. Office space should be available for the practitioners of the area. Here would be a central place to which all members of the community could come in their efforts to maintain good health. Here, physicians could assist one another in offering the public the benefits of their combined medical knowledge. Here also, could be pooled the health records of all persons in the community.

I am convinced that this pooling is essential to a true evaluation of health conditions. Medical science has long appreciated the diagnostic importance of the history of the patient. More recent scientific developments, of which psychosomatic medicine is one, have shown that the history must go far beyond the medical record of the individual. It must include all the social and familial facts which have been demonstrated to play an important role in the development of disease. This full information is essential to the private physician in diagnosing and caring for his patient. It is likewise essential to the health officer in planning intelligently the health programs of his community.

I believe that this information would lead us to a better understanding of factors which favor the development of disease—particularly those of young adulthood and middle age. In dealing with research on the so-called chronic diseases, we are handicapped by the

great time lag which, apparently, exists between the period when the deleterious agents come into contact with the organism and the period when the disease is first manifest. We often do not know to what extent the factors favoring onset of disease are introduced in childhood or early youth. We do not know, for example, how soon in childhood begins that damage to heart muscles which is evidenced in cardiovascular disease in adult life. With a pooling of information on all possible factors affecting the individual, and the possibility of observing those individuals over a long period of time, we may be in a better position to determine the natural history of some diseases.

The final step in correcting defects, of course, is to make treatment available when need for treatment is indicated. Perhaps I have been discussing the implications of Selective Service figures too much from the point of view of the medical statistician, interested in his own particular brand of research and prejudiced by the statistician's urge to gather more and more figures. However, I am the first to realize that the figures deal with impaired individuals and that from the point of view of the individual and the community, we must do something more than count him.

The figures have been used, with some justice, as indication for the need of support of a whole host of specific programs ranging through school health, chronic disease, dental care, accident prevention, maternal and child health, psychosomatic medicine and many others. But for the very reason that the implications of the results cover the whole gamut of preventive and curative medicine, attention to any single aspect of the data can provide only a partial solution of the problem presented.

It is beyond the scope of this paper or the competence of its author to discuss in detail the elements of a program to reduce the volume of physical and mental defects in our population. Obviously it is a tremendous job involving the development of ways and means to bridge the gap between scientific knowledge and its practical application. Further, it means a constant striving, through research, to push forward the frontiers of scientific knowledge. The solution also involves facilities, personnel and money. There are differences of opinion as to details but there seems to be considerable agreement on the following elements of a national health program:

1. *Facilities and organization.* To realize to the full the benefits of modern medical science, there must be an adequate system of hospi-

tals, clinics and health centers so located that every individual in the nation is within reasonable distance of one of these facilities. There must be regional organization of facilities with two-way communication between them so that patients can go from the health center on the periphery to the medical center, if necessary, and physicians on the periphery can have the advice of consultants in the medical center or other parts of the region. Adequate diagnostic facilities must be available to every individual in the region. Complementary to the provision of facilities, group practice should be encouraged to the widest extent possible so that physicians can have the advantages of working together with common facilities and ancillary personnel.

2. *Education.* There must be education both of professional personnel and of the public. The scope of medical education must be expanded to the end that physicians become advisers on health both to the individual and to the community. Medical practice has been concerned too much with disease and too little with health. In addition to physicians, we shall need more dentists and nurses and auxiliary personnel. Public education will be necessary, both in matters of personal hygiene and to stimulate the public to take advantage of the available services. Education of professional personnel must include the preventive and social aspects of medicine with a realization of the concept expressed by the Goodenough Committee in Great Britain in its study of medical education: "The fact that this person has fallen ill may be due to causes associated with home conditions, his work, or even with the manner in which he uses his leisure; his recovery may be hastened or retarded by his mental state while under treatment, and his full restoration to health may depend largely upon what facilities for rehabilitation are available to him, and on the social circumstances in which he finds himself after cessation of active medical treatment."

3. *Research.* To make greatest headway with our problem, we shall need greatly expanded research covering a very broad field. This might be called Public Health research—research that includes but goes beyond purely clinical and laboratory research and considers man's social environment and heredity as they affect health. Further, there is the whole field of administrative research into the best ways and means of making available to the people existing knowledge for the control of disease and the promotion of positive health.

4. *Finances.* Last, and perhaps most important, is the question of

financing an adequate health program for the nation. Some of the services in such a program can and should be financed from general tax revenues; in the main, however, many people seem to agree that the majority of families with regular income would prefer to pay for their medical care. But unless some method of prepayment of the costs of medical care can be set up for them, these families will undoubtedly continue to postpone their medical examinations and health check-ups until they are sick. By that time their condition may well have advanced to a stage requiring such expensive and prolonged treatment that the family cannot meet its medical bills. As Dr. George Baehr said in a recent paper (Recent Advances in the Medical Sciences; Their Application to Public Health) before the 74th Annual Meeting of the American Public Health Association: "The debate has narrowed down to two alternatives: (1) Immediate nationwide adoption of a compulsory system of medical insurance, or (2) gradual experimentation in local areas in order to determine the changes in the methods of rendering medical services which may be required under a voluntary or compulsory prepayment plan."

Since the time of the Civil War, the high proportion of physical defects found among young men being examined for military service has been viewed with alarm. Almost the only result observable in eighty years, however, has been a number of papers by medical statisticians. In those eighty years, however, we have learned to pool our resources in the natural sciences and technology. It is only one step further to pool our medical skills and facilities to assure each child and adolescent the right to health—insofar as our knowledge can provide that health. The good health of the next generation rests in our hands. Planning for and establishing adequate health services for all the people of the nation offers a challenge to the medical profession, public health agencies, and community leaders. It is for them to assure that preventive, diagnostic, and curative skills are used to their maximum extent in a nationwide drive toward a first essential in the better life which each generation must provide for those to whom it must turn over its unsolved problems.

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